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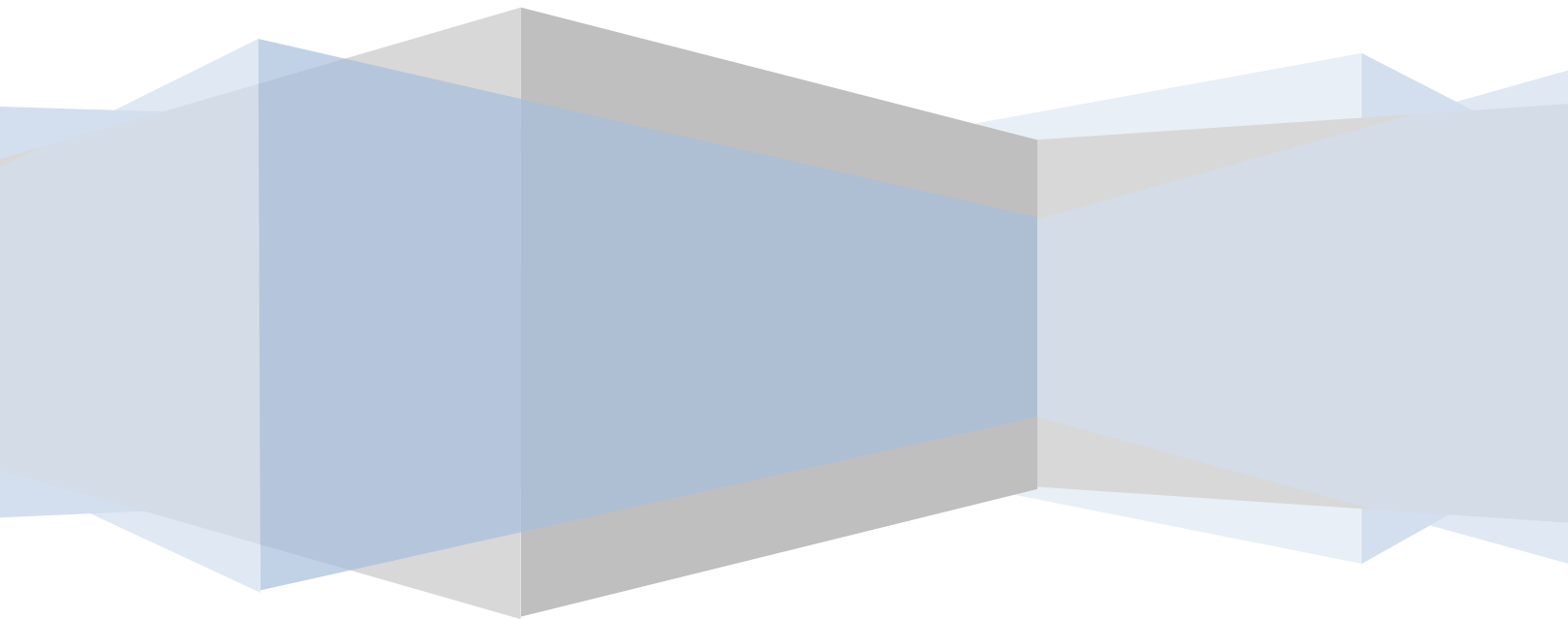
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Abstract

The purpose of this study was to determine whether the application of learning brain-friendly through the whole brain teaching a positive effect on the character of creative students, to study the response of the students, and to determine whether the students' response to the application of learning brain-friendly through the whole brain teaching positively correlated with the character of creative students in mathematics. The research method used is quantitative. The instruments used are student questionnaire responses related to the application of brain-friendly learning through the whole brain teaching and observation sheet on student creativity in the learning of mathematics after the implementation of this method. Results of research with correlation analysis show that the greater significance of the alpha value (5%), which means accepting and rejecting H_0 H_a which means students' response to the application of brain-friendly learning through the whole brain teaching is not positively correlated with the creative character of students in the learning of mathematics. The average score of the students' response to this methodology very well categorized in the amount of 85%. The results of the observation of the creative character of the students after the implementation of this method, the average score of 68% were categorized quite creative.

Keywords: Brain friendly learning, Whole Brain Teaching, Response, Creative Character

1. Introduction

National education serves to develop the ability and character development and civilization is aimed at developing students' potentials to become a man of faith and devoted to God Almighty, noble, healthy, knowledgeable, skilled, creative, independent, and became a warag democratic state and responsible. In essence teaching does not just deliver learning material, but interpreted also as a process of formation of

character, which means that schools are not only responsible for making the students become just smart, but also must take responsibility to empower themselves in order to have moral values that can be applied in everyday life as capital to build creativity and innovation. Therefore, the effort to develop the creativity of learners should be a part that should not be separated from each of the learning objectives, in addition, to equipping students with creativity, means have been giving them a tool that will certainly be required for the provision of live and thrive not only in the present but a useful tool to support their life in the future.

So the most important definition of creativity that the intent is not to say a new discovery that has never existed or were not known before, but creativity in question is a new product for themselves which do not have to be something new for others.

Be aware that cognition with emotion even though they are in a different brain area, but they have a strong bond of mutual influence, it can be proved at the sight of the emotional side of the learners, emotional situations will trigger students to be active and passive.

Creativity is closely associated with the cognitive development of the individual as creativity is a manifestation of the work of the brain. To support creative behavior in mathematics, not only the knowledge students need to be trained, but the attitude aspect must be given treatment that can help students to bring personal creative. Learning math is friendly, it is a renewal in the study of mathematics, namely the implementation of brain-friendly learning through the whole brain teaching.

Creative characters need to be owned by learners. the character is fundamental to foster creative ideas, new concepts, and divergent thinking, so prolific in academic (Arends, 2009; Papalia & Bertarelli, 2008; Nolan, 2004; in Meintjes & Groser, 2010). McWilliam & Dawson (2008) argued that the creative code includes the ability to solve the problem to find a solution, implement and foster new ideas.

Through these characters, is expected to have the ability to think creatively. Creative thinking serves to foster original ideas, raise the curiosity, increase flexibility, and improve the ability to identify relationships between concepts or ideas that can design a learning program (Lombard, and Grosser, 2008; in Meintjes, H. & Groser, M., 2010). Anderson, Krathwohl & Bloom (2001) argues that creative thinking is a synthesis of elements or reorganize elements into a new pattern, a new structure, new or functional coherence which is a combination of generalization, planning, and productivity. Craft, A. (2010) states that creative thinking consists of two levels, namely: (1) a high level of creative thinking, and (2) low-level creative thinking. High level of creative thinking with regard to something new and unusual that can be transformed into a variety of things significantly.

While Nolan (2004) found that creative is divided into two, namely: (1) creative behavior (behavioral characteristics, such as attitudes and dispositions that support the process of creative thinking) and (2) creative action (physical action in any work). According to Shi's (Meintjes, H. & Groser, M., 2010) creative behavior is the result of mutual interaction between the creative thinking, creative actions, and creative habits. Creative behavior is influenced by (1) contextual factors (education, social environment,

family environment, economic conditions and physical); and (2) individual factors (personality, intelligence, knowledge, and experience). Creativity is part of the psychology and may be described from three perspectives, namely: humanistic, existential, and psychology. According to Goleman, Kaufman & Ray (1992) creativity include Certain correctness, usefulness, valuable, meaningful, flexible, and open to new possibilities. Creativity is the foundation for developing scientific thinking (Innamorato, 1998), and is required by every teacher educators, particularly in mathematics (Meintjes, & Groser, 2010; Magno, 2011).

Results of research conducted Venon Magnesen (1983) that the human brain more quickly capture the information derived from the modalities of visual motion, which reads only a contribution of 20%, to hear 30%, seeing 40%, say 50%, at 60%, but see, say and do provide a contribution of 90%. Therefore, the need for a reform in the learning activities, where the presence of this update, expected to make the learning process that is readily accepted by every learner, activities that make the learner at the center of the learning process, as well as the creation of atmosphere of the class enjoyable and capable develop interest in creativity.

The results of preliminary observations and interviews on one of the State Junior High School in Indonesian shows the learning process of mathematics in the classroom at least have started oriented to the learning process that invites students to participate actively and creatively, it's just that the methods used are revenues less evenly distributed in terms of treatment given that not all students can receive and be actively involved in it because of the way or method used comes from the instruction that was adopted from a minor penalty, which is the beginning of the learning of all students instructed to stand and teachers will provide questions/problems, and for students who are able to answer the exact question, the students are allowed to sit back, different learning styles of every student is also one of the causes inhibition of the learning process is slow.

To support it, an educator must make a learning process that is able to optimize the function of the entire brain learners, and learn based on the natural workings of the brain, because in essence the human brain is divided into three main parts, namely: the neocortex, limbic system, and reptiles.

While the whole brain teaching will facilitate the work of the brain caused by the learning is not fragmented. Educators class setting with the right, which is able to foster a sense of safety, comfort, and a sense of enthusiasm in accepting the material/lesson, learning that such a brain-friendly learning or often referred to as brain-friendly.

Learning-friendly brains through whole brain teaching selected researchers as an alternative solution to address the statements that have been described above, the learning brain-friendly through the whole brain teaching is teaching instructional by optimizing the overall function of the brain where educators with the ability to use methods of creative and expected to develop the innovative creativity of their students and make the learning activities that can form the intelligence that refers to the brain development of students as a whole and develop a sense of safety, comfort, affection,

acceptance, enthusiasm in receiving the material and can improve students' attention and concentration.

In this method there is a movement which is a movement of symbolic meaning, which has a positive meaning and beneficial to help students understand what is learned, through this teaching in addition to optimizing the performance of the brain, also increase the active participation of students during the learning process, as well as increase the student's motivation and the ability of learners to communicate and enhance creativity.

Based on the mapping of the above problems, the focus of this research is on improving the response and character of students in the application of brain-friendly learning through the whole brain teaching. The following research questions:

1. Does the application of brain-friendly learning through the whole brain teaching a positive effect on the creative character of students in the learning of mathematics?
2. How is the response of students to the application of brain-friendly learning through the whole brain teaching in the learning of mathematics?
3. Is the students' response to the application of brain-friendly learning through the whole brain teaching positively correlated with the creative character of students in the learning of mathematics?

The results of this research expected to give some significances not only theoretically but also practically, go to:

1. For students, the material exerts teaching mathematics through the whole brain is expected to infuse the creative character of the student, can train students, to show something unique and displays new ideas, dare to take decisions quickly and accurately, curiosity continues to change and take advantage of new opportunities and able to solve problems in an innovative, flexible and critical.
2. For the teacher, brain-friendly learning through the whole brain teaching, is expected to be one of the alternatives and motivation for teachers to make innovations in order to create a fun learning process, and the creation of a situation of active learning and meaningful to students, as well as reference and motivation to teacher/educator is able to create a learning-oriented efforts to empower students and optimization potential of the brain.
3. For schools, the results can be used as input or suggestions to optimize all existing methods and models, not to mention brain-friendly learning through the whole brain teaching, which aims to improve the quality of education, quality of teaching and the quality of character education in particular.
4. For the study, is expected to improve the quality of education, especially in the cultivation of character education, and as a study of the application of mathematics teaching is appropriate so that the creative character of learners can be embedded early well as it should

2. Method

This research was conducted at Junior high school 4 Palimanan, Cirebon, West Java-Indonesia, with a time of execution of the research is estimated to be approximately six months starting from January to April 2016.

The research method used is the method of quantitative approach with wants. As for the design used in this study using One group posttest-only design. (Fraenkel, Wallen, & Hyun, 1993).

In the collection of data, this research uses techniques of observation, But observation types used in this study is an active participatory observation (Spradley, 2016). In addition, these studies use the question form. The model now in use are now models using Likert Scale (Brown, 2000). The instruments now used aim to obtain data about the response or responses to learners against the application of brain-friendly learning through whole brain teaching in the learning process.

The analysis technique used in this research is quantitative analysis (Miles, & Huberman, 1994). To answer the problem formulation first, measurement data creative character of students in mathematics in the analysis using inferential statistics, ie one sample t-test (Mielke, 1984). To answer the problem formulation while the second is the distribution of data from questionnaires concerning the application of brain-friendly learning through whole brain teaching in the analysis using descriptive statistics. As for the number three answer the problem formulation analysis product moment correlation between the application of brain-friendly learning through the whole brain teaching with creative character of students in the learning of mathematics.(Mendenhall, Sincich & Boudreau, 1996)

3. Results And Discussion

a. Response Students

Learning friendly brains through whole brain teaching is a learning method that is instructional, combined with the methods of cooperative learning, and aims to optimize the workings of the brain (the right brain and left brain) sebagaimana function during the process pembelajaran (Biffle, 2013; Bergen, & Coscia, 2001; Johnson & Johnson, 1994).

Brain-friendly learning through the whole brain teaching main characteristic of these is composed of three parts. The third part consists of visual learning, verbal, and kinesthetic (gesture). Where educators with the ability to use creative methods and expected to develop the innovative creativity of learners. in addition, teachers can create learning activities that can form the intelligence and refers to the brain development of students as a whole, creates a sense of safety, comfort, compassion, and acceptance during the learning process, a sense of enthusiasm in accepting the material / subject and can improve attention and concentration of students during learning activities take place. (Tri, Dafik, & Susanto, 2013)

Learning friendly brains through whole brain teaching has seven elements, known as the big seven of them are "class-yes", "teach-ok", "switch-ok",

"mirror-ok", "five classroom rules", "scoreboard", "hands and eyes" (Kagan, 2014; Willis, 2008; Sousa, 2009). As for knowing how big the students' response to the application of brain-friendly learning through the whole brain teachingini, the authors used questionnaires which totaled 25 statement items relating to the method.

Questionnaire distributed consisting of 16 indicators with reference to the concept Biffle and Kagan, as for a description of each indicator is as follows:

1. Students **feel relaxed and happy** on the condition alpha zone through instruction "Class-Yes" in mathematics, ie, by instruction "**Class-Yes**" These students are able to bring a sense of relaxed and happy before the learning begins.
2. Students are always **ready to accept the learning** of mathematics in the conditions of alpha zone through the **five elements of classroom rules**, mean that through the five elements of classroom rules, students should be able to always be ready to follow the mathematics learning activities.
3. **The teacher always know the initial conditions of students** in the learning of mathematics through the instruction "**Class-Yes**", ie, by instruction "Class-Yes" teachers also can determine the condition of students and classes in general, so that teachers understand and know what steps should be done with the condition students and classes at that time.
4. Students always **get a funny story** at the beginning of the learning mateamtika through new discoveries teachers, ie, by a new discovery well during the teacher outside the classroom as well as in the classroom.
5. Students are always motivated in learning mathematics through **scoreboard** element, ie, by elements of this scoreboard, the students will always feel motivated to continue to become better and better in following the activities of mathematics learning, by continuing to increase their knowledge and be able to play an active role during the learning takes place.
6. Students always felt **confident** in mathematics learning through instruction "**Teach-Okay**" and "**Switch-Okay**", mean that through directives and Switch Teach-okay-okay, students can train and foster self-confidence in following the teaching of mathematics, students trained to become a tutor/speaker and a good listener.
7. Students can **reflecthimself with emotions** on learning of mathematics through the five elements of classroom rules, mean that five classroom rules through the element's students are able to reflect on what is happening.
8. Students **get a lag time to set the rhythm of concentration** in mathematics learning through instruction "**Hands and Eyes**" and the five elements of classroom rules, mean that students always get the lag time to rest and be trained to be able to set the rhythm of concentration.
9. Students can **balance the workings of the brain** in learning mathematics through music and instruction "**mirror**", mean that the provision of learning

interspersed with music and Brain Gym, students will be able to balance the brain.

10. Students with **learning styles (visual)** can understand the material easily through the study of mathematics instruction "**Mirror**", ie, by the instruction "**Mirror**" is the student's learning style is more prominent on the visual side.
11. The student's **learning style (auditory)** can understand the material easily through the study of mathematics instruction "**Teach-Okay**" and "**Switch-Okay**", ie, by instruction "Teach-Okay" and "Switch-Okay", the students can catch and understand mathematics learning materials easily simply through exposure teacher, discussions, and peer tutors.
12. Students with **learning styles (kynesthetic)** can understand the material easily through the study of mathematics instruction "**Mirror**", ie, by the instruction "Mirror", the student's learning style is more prevalent in the kinesthetic, they can catch and understand mathematics learning materials with easily through some materials that the teachers presented in several gestures / movements adapted to the material being studied.
13. Students with **complex learning styles (auditory, kynesthetic, visual)** can understand the mathematics learning materials easily through the five elements of classroom instruction rules, which means that students with its diversity through the five elements of classroom rules is expected to easily adjust to what was going on around him.
14. Students can maximize the brain by doing **Brain Gym** through instruction "**Mirror**", that is to say through the Brain Gym activities and with the instructions mirror each student is able to maximize his brain.
15. Students can **strengthen** your **memory** via the instruction "**Teach-Okay**" and "**Switch-Okay**", meaning that through directives and switches teach-okay-okay which is an activity describes learning materials in turn, is expected to help students in strengthening students' memory the material they are studying.
16. Students can **release stress** during the learning of mathematics through the **Brain Gym**.

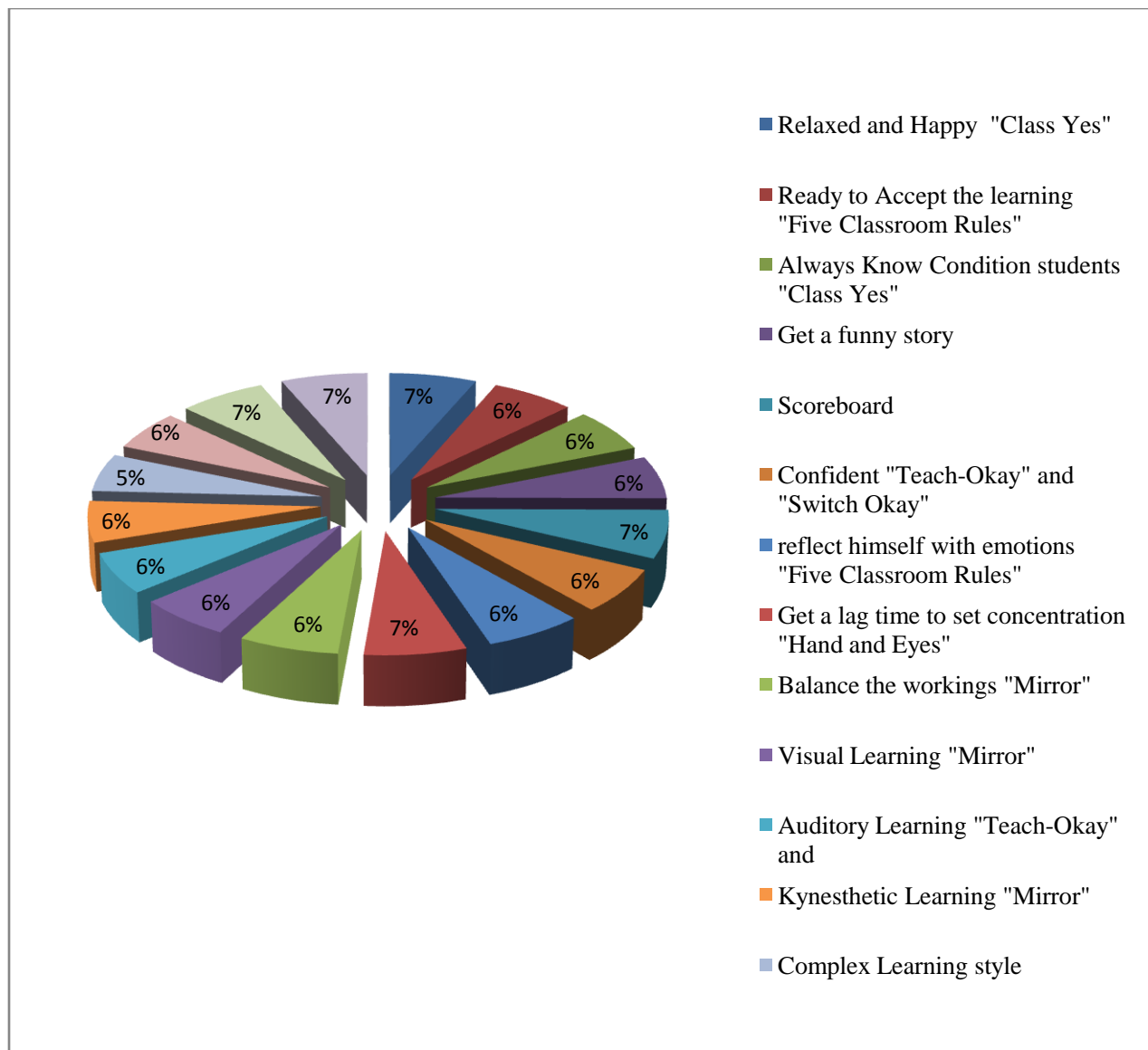


Figure 1 Propotion Indicators of Student Response

Based on calculations questionnaire regarding respond students to the application of the learning brain-friendly through the whole brain teaching, obtained an average percentage that is in a strong category (good), which means that during the learning process students can receive and play an active role in implementing any syntax of that learning.

The figure show that the highest percentage found in the indicator number 5 is always motivated students in the learning of mathematics through the element scoreboard with the percentage of 5,9%. The conditions in line with the view that the use of learning evaluation through the scoreboard can identify students' learning activities (Veronesi, 2000). Besides it is also supported by the view that a more active learning model effect on student motivation (Schunk,

Meece & Pintrich, 2012; Atkinson, 1964). While the percentage was lowest for the indicator number 13 indicators that student's learning style can understand the complex mathematics learning materials easily through the instruction "Mirror". This is consistent with the concept of learning styles of students in mathematics (Chinn, 2001). the tendency for students to learn the condition of imitation (Byrne & Russon, 1998; Kash & Parkes, 2010).

It can be interpreted that the brain-friendly learning methods through the whole brain teaching in mathematics have managed to build student motivation during the learning process. The condition looks to enthusiastic students in vying synthesize scoreboard points to fill, such as scrambling to do exercises, homework has been given. Many students in the class of research, no matter what a student really has a complex learning style as expected because on average they only have one more dominant learning style.

b. Character Creative Students

Characters creative students in the learning of mathematics is a collection of values inherent in human nature that underlies the thinking, attitudes, and behavior displayed by human beings are and have the ability to create new combinations based on what already exists in a person with all something which has students from both the formal education, informal, family and community circles.

Studies show that the forms of creativity depend upon individual interests and abilities, opportunities to do what they want to do, and activities that give the greatest satisfaction (Eisenstadt, 1978; Goertzel, Goertzel, & Goertzel, 1978; Simonton, 1999).

Some young adults find a creative outlet in hobbies while others choose vocations in which they can express their creativity. He observed that creativity is encouraged by a receptive as contrasted to a critical attitude toward novel ideas and that creative solutions are likely to occur during period of relaxed, dispersed attention that during periods of active concentration on a problem.

Guilford (1975) arrived at creativity constructs that are components of creative work. A contemporary view of creativity as an intelligence is explained by Sternberg (2006) in theory of successful intelligences. In this theory, creative intelligence comes out when individuals are faced with problems and they assess how well they can cope with relative novelty. This theory explains creativity when individuals experience problems and how they come up with solutions considering each problem is a new task. What consistently sets individuals who successfully engage in the creative process apart from those who are less successful is their dedication, commitment, steadfastness, vigor, and intensity- their motivation for creative work.

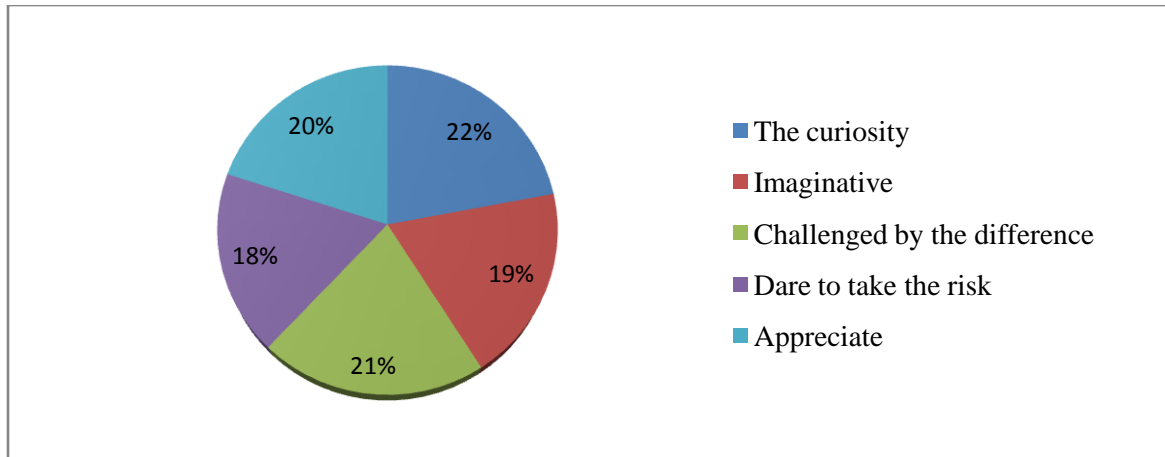


Figure 2 Proportion Indicator Creative Character Of Students

Based on observations regarding the creative character of the students after the implementation of brain-friendly learning through the whole brain teaching. Creative character of students in the learning of mathematics categorized quite creative. In addition the results of observations also show that the highest in the dimension percentse curiosity of students towards learning mathematics with a percentage of 22% and the lowest for the dimension presented attitudes of students in taking risks in mathematics that is equal to 18%. It can be interpreted that the actual students are able to bring a sense of enthusiasm and interest in learning mathematics. But most of them still do not dare to take the risk, as is the case when they gave an answer that is not necessarily true, there is still fear of failure or criticism from others, is still in doubt because of vagueness or less unstructured.

From the above the data can be known that the Reviews largest percentage contained in the dimensions of curiosity, it is in line with previous research has been done by Stiyowati (2014), where the research results mention that the use of methods of *whole brain teaching* significant effect on student learning activities, this is due Because students who had been passive and just watching it during the learning process in the classroom as active so the learning activities Increased. And reinforced by research conducted by Albab (2012), the which examines the application of *accelerated learning* approach with *whole brain teaching* method in teaching junior high school physics. Research results mention that *accelerated learning* approach to *whole brain teaching* method is Able to improve student learning outcomes for students not only hear and listen explanation of teachers but requires activity of students in the process of thinking, and body movements.

From the results of the two studies above reveal that through the *whole brain teaching* is Able to change the active role of students during the learning process for the better

c. **The Effect Of The Application Of Brain-Friendly Learning Through The Whole Brain Teaching**

Brain-friendly learning methods through the *whole brain teaching* was at least Able to change the state of some students Become a little more active in following the course of study of mathematics.

The application of brain-friendly learning through the *whole brain teaching* a positive effect on the creative character of students in the learning of mathematics. It can be seen from the presence of Several students who are creative category. The statement can be seen in the following table:

Table Observations Recapitulation Character Creative Students On Mathematics Learning

Scale Value	Frequency	Category
≥ 92	0	Very Creative
82 – 92	6	Creative
54 – 82	24	Quite Creative
40 – 54	6	Less Creative
≤ 40	0	Not Creative

Furthermore, the application of brain-friendly learning through the *whole brain teaching* on learning matematikamendapatkan very positive response. It can be seen from the average score of student response that is equal to 85%. Where a score of 85% is Considered that the very strong / good.

Table Criteria Indicators Questionnaire

No	Percentage(%)	Criteria
1	0– 20	Very Weak
2	21 –40	Weak
3	41 –60	Enoughpp
4	61 –80	Strong
5	81 –100	Very strong

Then the students' response to the application of brain-friendly learning through the *whole brain teaching* was not positively correlated with the creative character of students in the learning of mathematics. It can be seen from the significant value of 0,081. Because of the significance of > 0.05 then H_0 is accepted. So we can conclude that there is a positive relationship between students' response to the application of brain-friendly learning through the *whole brain teaching* with creative character of students in the learning of mathematics. Here are the results of the calculation:

Table Correlations

		Brain-Friendly Learning Through The Whole Brain Teaching	Creative
Brain-Friendly Learning Through The Whole Brain Teaching	Pearson	1	, 295
	Correlation		
	Sig. (2-tailed)		, 081
	N	36	36
creative	Pearson	, 295	1
	Correlation		
	Sig. (2-tailed)	, 081	
	N	36	36

Based on the analysis of correlation test to the research of data, it appears that the decision taken is accepting H_0 , the which means the brain-friendly learning through the *whole brain teaching* is not positively correlated to the creative character of students in the learning of mathematics , It can be seen from the significant value of 0,081. Because of the significance of > 0.05 then H_0 is accepted. So we can conclude that there is no positive relationship between brain-friendly learning through the *whole brain teaching* with creative character of students in the learning of mathematics.

This is Because the brain-friendly learning through the *whole brain teaching* is more relevant when applied to support the emotional development of students. As Noted by Kendra Cherry (2012). of the five methods of learning that support the emotional development of students. The fifth method is to learn by trial and error (*trial and error*) contained in the *scoreboard* element on brain-friendly learning through the *whole brain teaching*. Learning by imitation (*learning by imitation*) and learn by likening himself (*learning by identification*), this method is the use of elements of *Teach -Okay*, *Switch-Okay* and *Mirror-Okay*. Learning through training are the elements of the *Class-yess*, elements *Hands and Eyes*, and *Five Classroom rules*. And learning through conditioning, where this method is basically Aimed to create conditions students Become better and better at following each learning activity hususnnya when pembelajaran mathematics.

4. Conclusion

Departing from the discussion in the previous chapter, the authors put forward some conclusions as follows;The application of brain-friendly learning through the whole brain teaching a positive effect on the creative character of students in the learning of mathematics. The application of brain-friendly learning through the whole brain learning of mathematics teaching in getting a very positive response. It can be

seen from the average score of student response that is equal to 85% are in the very good category. Students' response to the application of brain-friendly learning through the whole brain teaching not positively correlated with the creative character of students in the learning of mathematics. It can be seen from the significant value of 0.081. Because of the significance of > 0.05 then H_0 is accepted. So we can conclude that there is a positive relationship between students' response to the application of brain-friendly learning through the whole brain teaching with the creative character of students in the learning of mathematics. This is because the brain-friendly learning through the whole brain teaching more relevant when applied to support the emotional development of students.

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